

**CONDITION REPORT TO SUPPORT AN ORDINANCE  
RESTRICTING ARTIFICIALLY ENHANCED WAKES  
IN THE WATERS OF THE TOWN OF HARRISON, LINCOLN COUNTY  
Proposed 2/1/24**

**Introduction**

Wisconsin's inland lakes are among the state's most critical natural resources and have incalculable aesthetic, environmental and economic value. In the interest of public health, safety, and/or welfare including the public's interest in preserving natural resources, and protection of the environment and outdoor recreation, the Town of Harrison ("Town") has the authority to enact ordinances covering waters within its jurisdiction, if the ordinances are not contrary to or inconsistent with Chapter 30, Wis. Stats., and they relate to the equipment, use, or operation of boats or to any activity regulated by Wis. Stats. Sections. 30.60 to 30.71 and 30.77 (3)(a).

**Purpose of the Ordinance**

The purpose of this ordinance is to (1) prevent the environmental degradation caused by artificially enhanced wakes and corresponding downward propeller wash generated by boats for wake sports such as wake surfing and (2) protect public safety.

Specifically, the proposed ordinance would ban the use of ballast tanks, water sacks or fins to cause a boat to operate in a bow-high manner or which increase or enhance a boat's wake. It also would prohibit operating a boat in an artificially bow-high manner having the effect of increasing the boat's wake; this would include prohibiting wake enhancement by the use of ballast tanks, ballast bags, mechanical fins or continuous operation at transition speed (the speed below planing speed in which a boat is operating in plowing mode). In no event would any of the following operations be deemed a violation of the ordinance, provided such operations do not use ballast tanks, wave shapers or electro-mechanical fins: 1) water skiing, 2) tubing, 3) wakeboarding using a tow rope, 4) brief transition operation to empty a boat of water, or 5) brief transition operation of a boat accelerating into a planing condition. Thus, restrictions on water skiing and other tow rope activities are not within the intended scope of the proposed ordinance.

Moreover, nothing in the proposed ordinance would preclude the use of wake boats, provided the ballast tanks and other features intended to create enhanced wakes or cause the boat to operate in a bow-up stern-down orientation are not deployed. These boats could continue to be used for cruising, water skiing and other activities provided the ballast tanks and other wave-enhancing features are not deployed.

Various studies and surveys (see Appendix 1) have been conducted that reveal the negative effects of enhanced wakes on inland lakes. The results suggest that these negative effects can largely be avoided if the lake size is more than 1,500 acres; and the distance of the enhanced wake boating activity is at least 700 feet from the shoreline or other lake users and in water depths of at least 20-30 feet.

By increasing displacement of the boat and equipped with very powerful engines, wake boats impart very large quantities of energy. The energy of these waves increases with the square of their amplitude, such that a two-fold increase in wave height generates four times more energy and a three-fold increase in wave height generates nine times more energy<sup>1</sup>. Most of this wave energy is conserved until it encounters shallow water, concentrating energy on all materials or

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<sup>1</sup> Formulas for Boat Wakes, webpage <http://boatwakes.homestead.com/files/form.htm>

objects present, including the shoreline, lake bottom, wildlife habitat, docks, moored boats, swim rafts and other lake recreators.

When wake boats operating in a bow-up stern-down manner, the propeller wash may scour the lake bottom to depths of 20 feet or more, destroying aquatic vegetation and fish spawning beds, and churning the sediment into the water column, degrading the water quality.

## **Local Conditions Necessitating a Local Ordinance**

In recent years, there has been a dramatic increase in boats equipped to generate artificially enhanced wakes on a number of lakes in proximity to the Town of Harrison. More lake residents are expressing concern about the effects of enhanced wakes on their environment and on public safety.

The Wisconsin DNR's Spring 2023 Survey results indicate that both Oneida County residents and those who recreate in Oneida County are overwhelmingly in favor of legislation that would regulate the operation of boats in a manner that creates artificially enhanced wakes.<sup>2</sup> Oneida County is adjacent to Lincoln County.

- Harrison has 8 lakes and flowages greater than 50 acres<sup>3</sup> (see table in Appendix 2).
- The largest lake in Harrison is just over 200 acres.
- Harrison would like to take a proactive approach to regulation of this activity based on the effects seen in surrounding Townships
- Artificially enhanced wakes can cause irreversible damage to shorelines, lake beds, moored boats, and shoreline structures. Enhanced wakes and the associated propeller wash can uproot aquatic plants and resuspend the lake sediment. This churning action can increase phosphorus levels in the water column that lead to algae blooms. Any toxic substances that may be present in the sediment reenter the water column, degrading water quality and posing additional risks to aquatic wildlife and plants.
- Enhanced wakes have negative effects on wildlife, such as the nests of loons and other waterfowl.
- The use of ballast and wake-enhancing fins, vanes, shapers or other such devices puts the boat in a bow-up stern-down position. This may obstruct the driver's view, leading to increased safety risks for others on the lake: anglers, kayakers, paddleboarders, and swimmers. There have been various reports of close-call encounters between wake boats and other water sport enthusiasts.
- Ballast systems are virtually impossible to empty completely, thereby increasing the risk of carrying aquatic invasive species from one lake to another, which is illegal in the state of Wisconsin.
- As a result of artificially enhanced wakes on nearby lakes, property owners have reported numerous incidents and complaints:
  - Damage to docks, piers, seawalls and boats as well as moored boats breaking their ties due to enhanced wakes

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<sup>2</sup> [https://dnr.wisconsin.gov/sites/default/files/topic/About/WCC/2023/SpringHearing/2023\\_CountyResults.pdf](https://dnr.wisconsin.gov/sites/default/files/topic/About/WCC/2023/SpringHearing/2023_CountyResults.pdf)

<sup>3</sup> Per 30.635, Wis. Statutes, on lakes 50 acres or less having public access, motorboats may not be operated in excess of slow-no-wake speed, except when such lakes serve as thoroughfares between 2 or more navigable lakes.

- Shoreline damage, severe erosion and high turbidity with clear lakes turning murky as sediment re-enters the water column
- Fish and habitat damage, including significant amounts of weed floating on the water and washing up on shore
- Nearby lake users also report they are unable to use the lake out of concerns for safety when just one or two boats are out operating in wake-surf mode. For example:
  - Kayakers and paddlers not going out on lake when wake surfing activity is occurring
  - Boats towing skiers or tubers returning to their docks out of safety concerns
  - Anglers having to move to other areas of the lake to ensure they can safely fish
  - Pontoon boats getting swamped or completely re-routing to avoid entire areas of the lake when a wake boat is generating enhanced wakes
  - Young children not being able to play in the shallows given the wave energy from a wake boat's enhanced wakes

Refer to Appendix 3 for a sampling of specific incidents.

### **How a Town Ordinance Would Solve the Above Issues for Harrison**

Compliance with a Town ordinance prohibiting boats from generating artificially enhanced wakes would result in the following benefits for the Town:

- The negative environmental impacts associated with boats generating artificially enhanced wakes, described above, would be prevented.
- The safety risks associated with boats generating artificially enhanced wakes, noted above, would be eliminated. Everyone enjoying the lakes would be that much safer.
- The likelihood of ballast tanks used by these boats transferring aquatic invasive species from one lake to another would be reduced or eliminated.

Upon adopting the proposed ordinance, appropriate signage would be placed at all public landings, in accordance with Wisconsin law. Based on the experiences of other Wisconsin municipalities that have adopted ordinances regulating the creation of enhanced wakes, such signage and general education regarding the ordinance will help ensure compliance.

### **Possible Negative Effects of Adopting the Ordinance**

Certain individuals may be opposed to any or all forms of regulation and a limited number may feel the ordinance is infringing on their rights to lake usage. However, when one or two people can operate boats that intentionally generate artificially enhanced wakes on small or mid-size lakes, many others can't navigate safely or enjoy their activities and the scenic beauty, water quality and aquatic habitat will be damaged or destroyed.

The boating industry claims they can self-regulate. However, this has not proven to be the case given the mounting damage and concerns raised by other lake users.

### **Impact on Public Health, Safety or Welfare if the Ordinance is not Adopted**

After reviewing science-based studies, lake experiences and public input, the Town of Harrison concluded that public safety and protection of its valued resources would be best served by adopting the proposed ordinance.

## Appendix 1

### Relevant Research Studies and Surveys

Several studies contributing to the facts in this condition report were completed a few years ago. Since that time, boats generating enhanced wakes have become more powerful and their wakes bigger (e.g., increasing in height from 2-4 ft. to 4-6 ft, and more) and more powerful. Therefore, the figures cited in this report are likely conservative. More studies are underway and in review.

- Ballast tank water retention and invasive species: “Volume and contents of residual water in recreational watercraft ballast systems,” *Management of Biological Invasions* (2016) Volume 7, Issue 3: 281-286, first published online 04/18/2016, [https://www.reabic.net/journals/mbi/2016/3/MBI\\_2016\\_Campbell\\_etal.pdf](https://www.reabic.net/journals/mbi/2016/3/MBI_2016_Campbell_etal.pdf).
- Wave height, power and energy: “A field study of maximum wave height, total wave energy, and maximum wave power produced by four recreational boats on a freshwater lake,” St. Anthony Falls Laboratory, College of Science & Engineering, University of Minnesota, SAFL Project Report No. 600, 02/02/2022, <https://conservancy.umn.edu/handle/11299/226190>.
- Wave size, power and turbidity: “A phased study of the water quality and wave propagation dynamics currently impacting a small southeast Wisconsin freshwater lake: Waukesha,” Terra Vigilis Group, as contained in *Responsible Wakes for Vermont Lakes* (see pp 16-37 of linked presentation where study is embedded), <https://dec.vermont.gov/sites/dec/files/wsm/lakes/docs/Additional%20supporting%20Information%20submitted%2007292022.pdf>.
- Oneida county public sentiment support for regulating artificially enhanced wakes to lakes of greater than 1500 acres and 700 feet from shore: “2023 Spring Hearing Results by County,” Wisconsin Conservation Congress and Department of Natural Resources, 04/20/2023, <https://dnr.wisconsin.gov/sites/default/files/topic/About/WCC/2023/SpringHearing/2023CountyResults.pdf>.

## Appendix 2

Lake Name	Surface Area (acres)	Max. Depth (ft)	Mean Depth (ft) (where known)		Comments
Bass Lake	100	43			
Harrison Lake	206	8			
Hildebrand Lake	60	24			
Hilts Lake	59	64	22		
Long Lake	132	62			Long, irregular shape, and narrow
Pine Lake	135	17	9		
Seven Island Lake	132	31	14		Long and narrow
Squaw Lake	79	44			Long, irregular and narrow

## Appendix 3

### Sample of Testimonials (Town of Newbold, Oneida County) from Lake Users on Enhanced Wakes Impact

The following are a sampling of statements from lake users on a few Town of Newbold lakes.\*

#### Lake Mildred

- My experience with wake boats: My pier was torn loose from the steps on my shoreline, with my boat tied to it. Makes for some anxious moments keeping the whole works from hitting my neighbor's pontoon next door.
- Lake Mildred is a gin clear lake where you can see down up to 30 feet. After one of these battleships (wake boats) makes a couple laps, the water is turbid and brown. This is caused by all the sediment stirred up from the bottom by their tsunamis before they impact the shore.
- When one of these wake boat waves impacts the shore it hits with much impact, rearranging rocks, logs and really beating up the tree roots trying to hold on. These waves are rollers by design, not breakers like a non-wake boat puts up. The breakers moderate pretty quickly, where the rollers don't seem to dissipate until they impact land. I didn't see much difference from a wake boat wave that began 200 feet off shore or one that came from 700 feet out.
- Aside from the damage to everything, when one of these monsters is running laps no one else can use the lake. If you are fishing or cruising and a wake boat is coming by, you best sit down fast, or you will be swimming shortly. I got caught in two sets of wake boats waves where they were intersecting each other in a 16-foot Lund. Even immediately taking a seat didn't do much good. Thought I was going to capsize for a while. Obviously, kayaks, canoes, paddle boards, etc. can't consider using the lake while a wake boat is running.
- I've lived on Mildred for more than 25 years and put up with a lot of skiers and the mindless jet skis as well. But these things are beyond all common sense and reason and have me thinking of selling and getting the heck off the lake. If you sat on my pier when one of these scourges is operating you would not come to the conclusion that this makes sense or is a good thing in any way, shape or form. On a lake this size and shape, wake boats are a canoe in a bathtub. The selfishness, mindlessness and utter stupidity of running one of these things, ruining everyone else's day and destroying the environment is truly beyond belief.
- I'm told these wake boats make up less than two percent (sounds high to me) of all boats in Wisconsin, not counting unregistered small non-motorized craft. Allowing these things to run rampant at the expense of the environment and everyone else's enjoyment is the epitome of the tail wagging the dog. Let's bring it to an end.
- We've experienced five feet of erosion on a section of our shoreline. This occurred about five years ago when there were two wake boats on Lake Mildred. We have rip rapped our shoreline twice and are still having erosion problems when there is a wake boat on the lake. The attached video was taken in July. The boat was over 300 feet from our shoreline. At first the wake seems small - it's like a tsunami. Watch as it hits [Wake boat video July 2 2023.mp4](#)

## **Pickereel Lake**

- A 75-year-old woman kayaker was almost hit and close to being run over by a wake boat. This was due to operator not having a clear line of sight to seeing what was ahead in the water. As he passed and realized, he yelled “oh, sorry.” I witnessed this personally from my pier in a nearby narrow channel on Pickereel Lake.
- Three men standing while fishing one night in a narrow channel were passed by a wake boat at close proximity sending two fishermen falling in their boat.
- Piers lifting from sand bottom as wake boat roller waves come ashore. Waves are so big they slam or crash up over piers and it becomes unsafe sitting on piers or if other occupied kayaks/boats/sailboats are moored/resting next to pier. I have heard many complaints on this.
- Extreme acceleration of erosion along a shoreline has been experienced from unnatural wave action created by plowing of water causing rollers to wash ashore from wake boats primarily at a point (and turn into narrow channel) with a sandbar where property owners swim and have a pier. Sediment on sandbar is increasing.
- Adult kayaker was dealt three series of three roller-type waves in large bay after wake boat passed and made circle. They had to turn bow to head into rollers to evade capsizing.
- Property owners over the last 10 years have had expenditures (in the thousands of dollars) investing in riprap (boulders) to hinder increasing amount of erosion of their shorelines due to unnatural roller-type waves created by wake boats too close to shore and crashing over existing rocks.
- Paddle boarders don't go out when wake boats that cause unnatural, large hazardous wakes are operating.

## **Two Sisters Lake**

- This past August we had a wave generated by a wake boat wash over the deck of our pontoon boat on the small lake, near the island, which caused some passengers to slip. No one fell but we could see how it could be dangerous.
- Over the summer of 2023, at least one wake boat regularly operated back and forth in the lake in front of our house. I could see the shift in the boat as it was filling its ballasts.
  - The dock has rocked alarmingly – far more than experienced with other boat traffic and our pontoon boat snapped one or more of its ties on a few weekends of wake boat activity.
  - We have had to rake up piles (e.g., multiple laundry baskets) of loose native milfoil floating onto our shore after seeing wake surfing activity in front of our dock.
  - The waves coming into our shore – even when the wake boat was out several hundred feet – were huge. Other than about 10 feet for access to the pier, our shore is all native with trees, sedges and alders. I fear if this activity continues, we will have to “fortify” the shoreline with riprap. To lose that native Northwoods shoreline because of enhanced wakes caused by a few people creating ocean-sized waves would be terrible. Not only the cost that would be incurred to “armor”

the shore with rock, but the aesthetics and, most importantly, the native habitat it offers to aquatic and shoreline critters. It doesn't make much sense that grants are available to restore shorelines but wake boats are allowed to go out and throw giant wakes that erode shorelines. Why not just stop the destruction before it happens? These wakes don't belong on inland lakes.

- More than 1,000 feet across from our shore is the island. Even when the wake surfing is closer to the island shore than ours, we still experience significant wakes rolling over our shore, stirring up sediment, creating murky water, and resulting in weeds washing up on the shore or floating out by the dock, which means it's probably even worse on the natural shoreline of the island.
- I generally don't go out kayaking on our lake on windy days. However, now I also must factor in wake boats. I can get a fair reading on the winds, but I have no way of predicting when I will encounter a wake surfer. If I'm already out paddling, I'll try to figure out the safest way around them, even if it means cutting short my paddle, staying out longer to take a wider path around them or ducking into a bay and waiting for them to leave the area. If I've yet to go out, and see wake boats are already out, I'll cancel my paddle. It's just not worth capsizing.
- One weird thing we saw when fishing was a whole field of vegetation floating in shallower water.
- There have been times when out tubing and some people started wake surfing so we just left. There just is not enough room on the water at Two Sisters to operate ski boats in the same area as a wake boat without hitting big waves. We have had to slow our boat way down before going through those big waves leaving the person on the tube bouncing through them. It has not thrown anyone from the tube because the boat had slowed but it has caused us to leave. It just is not fun to tube that way. When we take family and friends tubing and skiing, we are careful and just do not feel comfortable with those big waves.

\* Statements have been edited slightly for format, length, clarity and grammar as needed.